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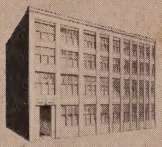

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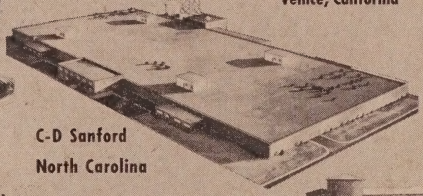

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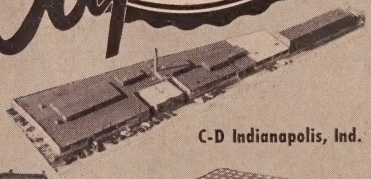

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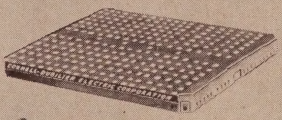

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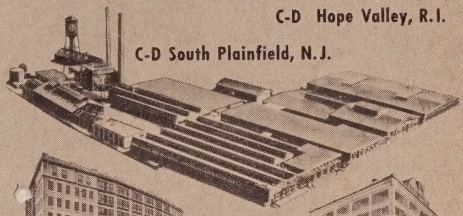

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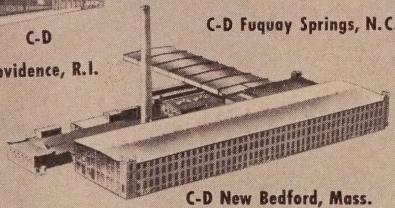

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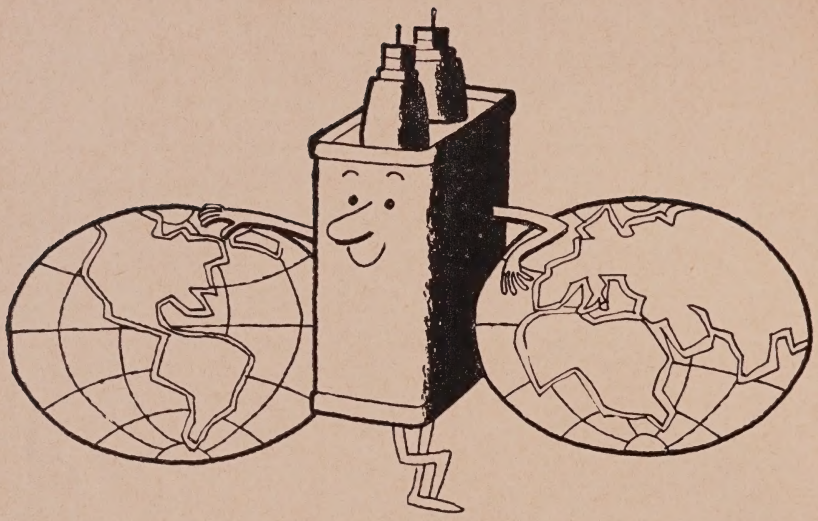

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PHOTOELECTRIC R-F WATTMETER

On various occasions, photoelectric radio-frequency wattmeters have been mentioned in the popular literature. However, the writers have hardly gone beyond the point of explaining the general principle of power measurement "with a lamp and light meter." Seldom has a complete instrument been described or any inkling given as to response. Technicians who have tried to put the method into practice have voiced many complaints.

This article describes a simple r-f wattmeter of the photoelectric type. This instrument may be duplicated easily and is calibrated from the a-c power line. While this wattmeter has been designed for a maximum power input of 25 watts, similar in-

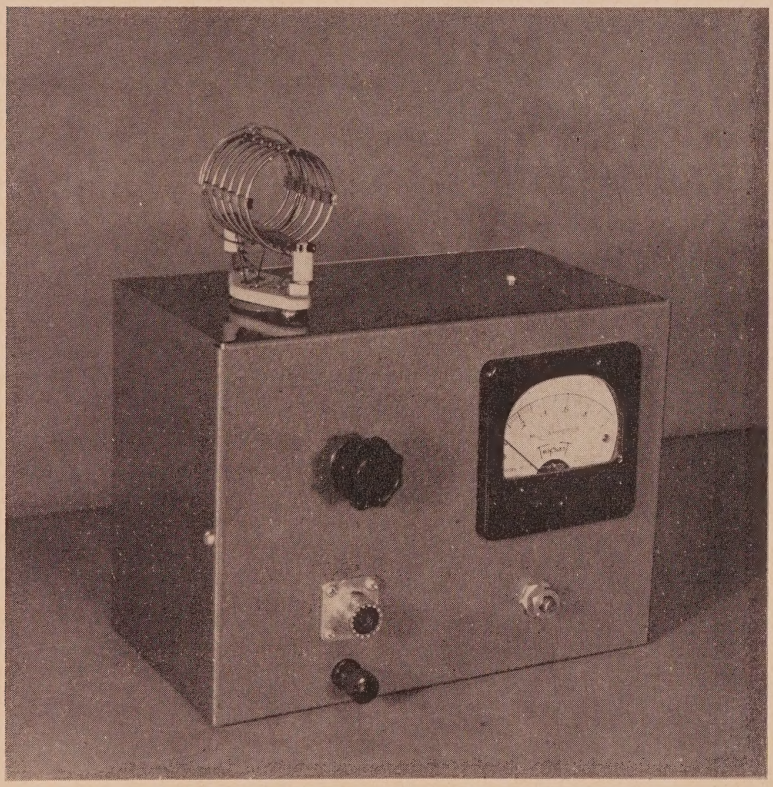

Fig. 1. Completed Photoelectric R-F Wattmeter. The instrument is built in an aluminum chassis box 8¼" long, 6" high, and 4½" deep, and is link-coupled to the transmitter under test. Compare with Figure 4 for identification of components.

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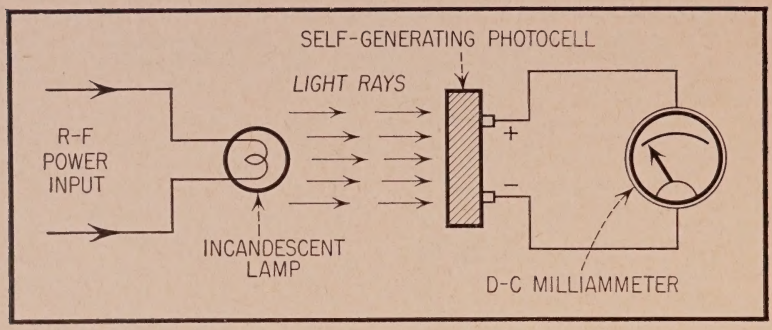


Fig. 2. Principle of Photoelectric Wattmeter.

struments can be built to cover higher power ranges, as will be explained later. The completed wattmeter appears in Figure 1.

Operating Principle

Figure 2 illustrates the basic operating principle of the photoelectric wattmeter.

A-C power from the device under test lights an incandescent lamp. The brilliance of the lamp is proportional to the amount of power consumed by the lamp. Light rays from the lamp actuate a nearby self-generating photocell which, in turn, drives a d-c milliammeter. The deflection of this meter thus is proportional to the power consumed by the lamp. The setup may be calibrated by feeding known amounts of power into the lamp and noting the corresponding deflections of the meter.

Certain requirements are immediately apparent: (1) The separation betwen the lamp and photocell must be held constant by means of solid mountings, (2) cell and lamp orientation must be permanent, (3) the cell must be protected from room lighting, (4) for maximum power transfer the lamp circuit must be tuned to the frequency of the transmitter or oscillatior to which it is coupled, (5) a suitable means must be provided for coupling the tuned circuit of the instrument to the transmitter under test, and (6) a suitable calibration control must be incorporated into the wattmeter for initial standardization and to compensate for aging effects in the lamp and photocell. These factors have been considered in the design of the complete instrument described in this article.

As a transmitter output-power-measuring device, the tuned photoelectric r-f wattmeter has the additional advantage that it makes an excellent tuned dummy antenna. In this application, it offers resistive loading at all except very high frequencies and is useful for testing both c-w and phone transmitters.

Complete Circuit

Figure 3 shows the complete circuit of the wattmeter. The simplicity of the instrument is apparent from this schematic.

R-F power is fed into the instrument, via coaxial jack J, through a 52-ohm coaxial cable (RG-8/U) from the transmitter. If the transmitter does not have low-impedance output, link coupling may be provided by means of a 2-turn coil 2 inches in diameter attached to the free end of the cable and inductively coupled to the "cold" end of the transmitter tank coil.

The tuned circuit comprises coils L_1 and L_2 and the variable capacitor, C_1. Midget, plug-in, low-power trans-

mitter coils are employed. These are readily obtainable at amateur supply houses. L_1 is the end-link winding on the tank coil, L_1. In Figure 1, the 10-meter coil is shown plugged-in. These coils plug into a standard 5-pin tube socket and are available for the 6, 10, 15, 20, 40, 80, and 160-meter bands. Tuning capacitor C_1 has a maximum capacitance of 100 uufd.

A 25-watt, 120-volt incandescent lamp, PL, is connected in series with coil L_2 and tuning capacitor C_1. When the tuned circuit is resonated to the frequency of the incoming signal, this lamp glows at maximum brilliance for the particular power level.

The self-generating photcell, PC, picks up light rays from the lamp. The resulting d-c output of the photocell deflects a 0-1 d-c milliammeter, M. Potentiometer R is a 250-ohm unit by means of which the meter may be set, during the calibration procedure, for full-scale deflection when a full 25 watts are consumed by the lamp. Radio-frequency choke RFC and bypass capacitor C_2 remove any rf which stray coupling might introduce into the meter-and-photocell circuit. Note that a common connection to chassis (metal case) is provided in all portions of the circuit and that a terminal is supplied for connection of the case to an external **earth** ground.

Mechanical and Electrical Construction

Figures 1, 4, and 5 show constructional details of the instrument.

The housing is an aluminum chassis box 8¼" long, 6" high, and 4½" deep (LMB No. 146). Tuning capacitor C_1, r-f input jack J, meter M, calibration control R, and the external ground binding post terminal are mounted on the front panel of this box. (See Figures 1 and 4). The 5-pin tube socket for the plug-in coils is mounted in a 1¼"-diameter clearance hole in the top left of the box.

Figure 5 shows the internal construction and wiring. The photocell is seen directly behind the milliammeter. A dime-store right-angle brass bracket (1" x 1" x ½") is fastened to one of the mounting screws of the cell and held by a 1½"-long 6-32 screw from the top of the box. This makes a simple but rigid mounting for the cell. The lamp is held by

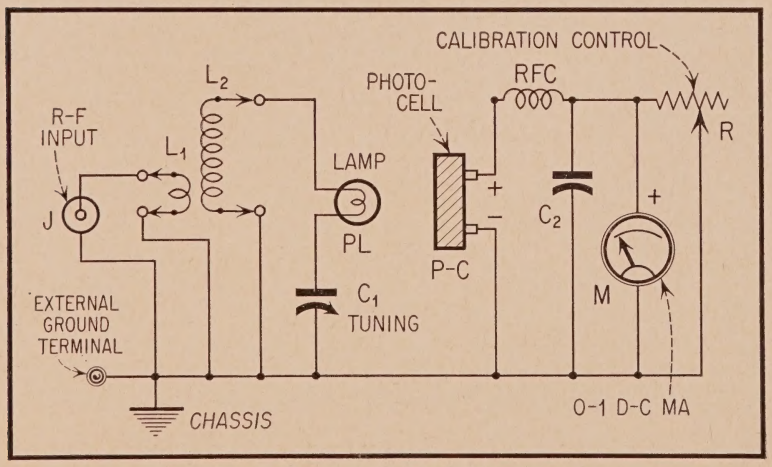


Fig. 3. Complete Circuit of Wattmeter.

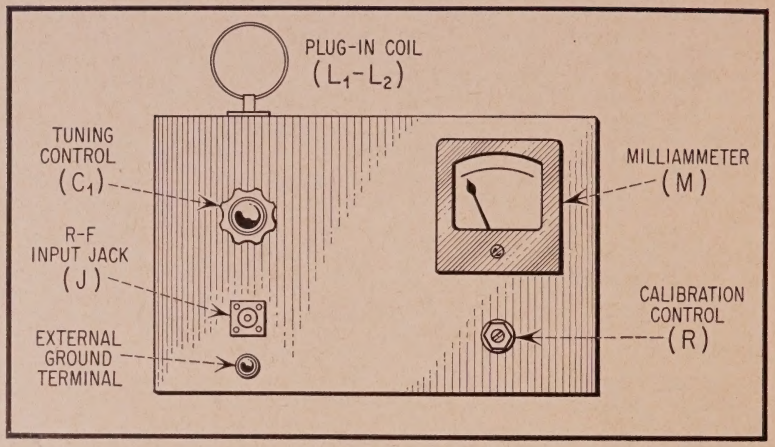


Fig. 4. Front-Panel Layout.

stiff bus-wire leads. One lead is soldered to the center contact button of the lamp base and to one terminal of the coil socket (top terminal of L_2), and the other lead is soldered to the shell of the lamp base and connected to the nearest stator lug of variable capacitor C_1. This mounting is rigid and the lamp leads are short. A lamp socket was not used, in order to keep stray capacitances low. The separation between the lamp and photocell is 2½ inches.

The input jack (J) is connected to the link terminals of the coil socket by means of a 7-inch length of twisted pair. A short piece of coaxial cable or low-impedance twin-lead antenna ribbon also might be used and is somewhat neater.

Observe carefully the polarity of the photocell and the meter. Correct polarities are shown in Figure 3. If this is not done, the meter will be deflected backward when the cell is illuminated. One pigtail of the r-f choke is connected directly to the positive terminal of the photocell, and the other pigtail to the positive terminal of the milliammeter. This makes a simple point-to-point mounting for the choke and automatically completes the +dc circuit. A twisted pair connects rheostat R to the meter terminals.

Since rheostat R requires adjustment only during calibration, it is protected from accidental tampering by means of a shaft-locking nut and slotted shaft for screwdriver adjustment. The locking nut is seen in place in Figure 1. The control specified in Figure 3 has both lock nut and slotted shaft.

Initial Calibration

The completed instrument may be calibrated from the power line. Figure 6 shows the calibration circuit. The lamp in the wattmeter is operated from the Variac which permits the lamp voltage to be adjusted smoothly between zero and 135 volts. The power consumed by the lamp at any voltage in the range is calculated by multiplying the a-c voltmeter deflection (in volts) by the a-c milliammeter deflection (in amperes). Thus, when the voltmeter reads 90 v and the milliammeter 172 ma, the power equals 90 x 0.172 = 15.48 watts.

To make the calibration, follow this procedure: (1) Remove the coil from its socket. (2) Run two insulated

wires through tube socket holes and connect them temporarily to the lamp. (3) Connect the other ends of these leads to the output of the calibration circuit (Figure 6). (4) Fasten the instrument box together tightly to exclude all room light. (5) Set the Variac to zero. (6) Insert the line plug into an a-c receptacle, and switch the Variac on. (7) Advance the setting of the Variac to obtain a voltmeter and milliammeter deflection corresponding to 25 watts (for example, 120 v and 208 ma). Note that the d-c milliammeter in the wattmeter is deflected. (8) Adjust rheostat R for exact full-scale deflection of the d-c milliammeter. The 1-ma deflection thus corresponds to 25 watts. (9) Reduce the Variac to successively lower voltages, in as many separate steps as practicable, and record the deflections (E) of a-c voltmeter M_1 and the deflections (I) of a-c milliammeter M_2 and the deflection of the d-c milliammeter at each step. Deflections of the d-c milliammeter will be obtained down to the first graduation of its scale (0.02 ma). (10) From the recorded E and I a-c values, calculate the power (E x I) at each step. (11) Plot these wattage values against the d-c mill-

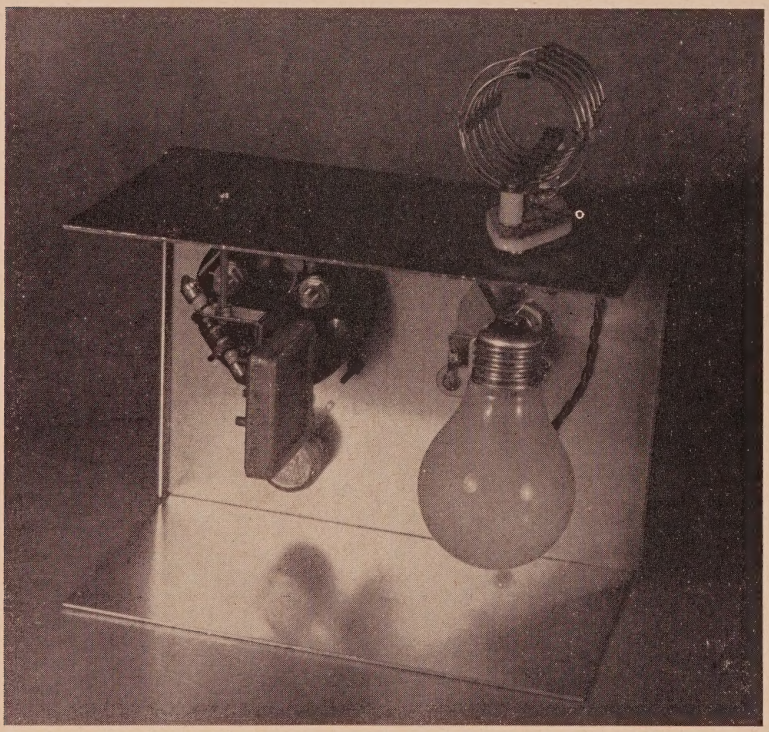


Fig. 5. Inside view of the completed instrument. The photocell is mounted on a right-angle bracket held from the top of the case by a long screw behind the meter. The 25-watt lamp is attached by means of stout pigtail leads to the tuning capacitor (C_1) and coil socket.

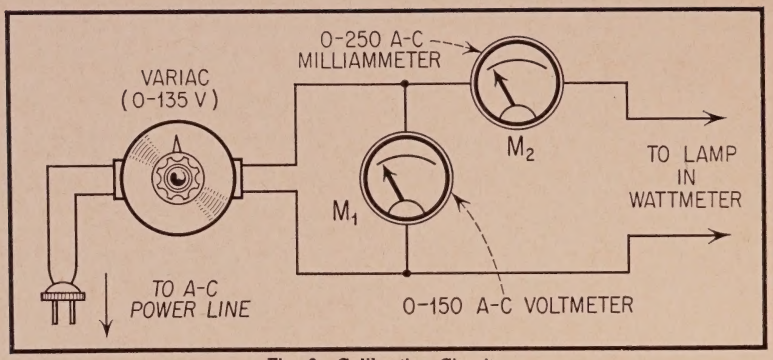


Fig. 6. Calibration Circuit.

iammeter deflections. Figure 7 shows a plot of this kind made for the Editors' instrument. (12) This graph may be referred to in reading power levels with the instrument later, or points may be taken from it for preparing a special direct-reading wattage scale for the d-c milliammeter. Figure 8 shows the comparison of such a direct-reading watts scale with the d-c milliammeter scale. (13) Remove the leads connecting the lamp to the calibration circuit. **Do not disturb the positions of the lamp or photocell.**

Using the Wattmeter

The transmitter or power oscillator under test must be disconnected from the antenna or any other load device into which it normally operates, and coupled to the wattmeter. If the transmitter has low-impedance output, a coaxial cable may be run simply between the output jack of the transmitter and input jack J of the wattmeter. If the transmitter has only high-impedance output, a link pick-up coil consisting of 2 turns of insulated wire 2 inches in diameter (connected to the free end of the coaxial

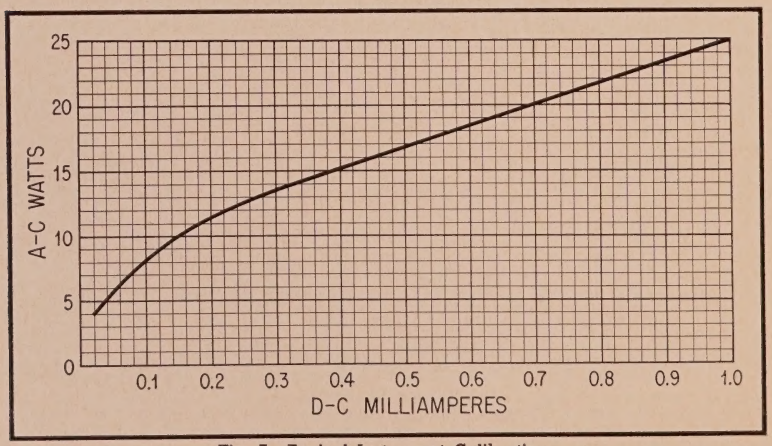


Fig. 7. Typical Instrument Calibration.

cable from the wattmeter) may be inductively coupled to the "cold" end of the transmitter tank coil. (1) Insert the proper coil into the wattmeter coil socket. (2) Connect the external binding post terminal to a good earth ground by the shortest possible heavy lead. (3) Switch-on the transmitter and tune it to the operating frequency. (4) Resonate the wattmeter circuit by tuning the variable capacitor, C_1, for maximum deflection of milliammeter M. (5) From this meter deflection, read the power in watts from the calibration curve (such as Figure 7) or from the direct scale (such as Figure 8).

The wattmeter as it is shown in Figure 1, is boxed tightly to prevent the entry of extraneous light. Since this shuts out air as well, the instrument should not be operated continuously over very long periods of time, as the heat from the lamp will alter the photocell characteristics temporarily. If long-term operation is projected, a case having ventilating louvers must be employed. Furthermore, the louvers should open downward to minimize the entry of light. The relatively small amount of heat generated by the 25-watt lamp has not been found excessive during continuous operating periods up to 15 minutes or during broken periods up to 1 hour. When short on periods are followed by long off periods, the operator need not worry about heating due to the 25-watt lamp.

Extending the Range

If a higher-wattage lamp is employed and the instrument is recalibrated in the same manner as explained earlier for the 25-watt lamp, the wattmeter may be used for the measurement of higher power levels.

When using 100-watt and higher-powered lamps, however, the photocell must be mounted farther away from the lamp, than is indicated in the 25-watt instrument, to protect it from the increased heat. Also, some means must be provided for circulating cooling air through the box. This may be done with the aid of louvers and a small, motor-driven blower of the type used to cool transmitting tubes and available from surplus stores.

PARTS LIST FOR FIGURE 3

C_1——100-uufd midget variable capacitor (0.0245" plate spacing) — Hammarlund MC-100-M

C_2——0.002 ufd mica capacitor — Cornell-Dubilier 1W5D2

J——Coaxial female chassis receptacle — Amphenol SO-239

L_1-L_2——End-link, low-power, plug-in transmitter coil for desired band — Barker & Williamson JEL

M——0-1 D-C Milliammeter — Triplett 327-T

P-C——Self-generating photocell — International Rectifier Corp. DP-5.

PL——25-watt, 120-volt incandescent lamp

R——250-ohm potentiometer with slotted shaft and shaft lock-nut — Ohmite CLU-2511

RFC——2½-millihenry r-f choke — National R-100

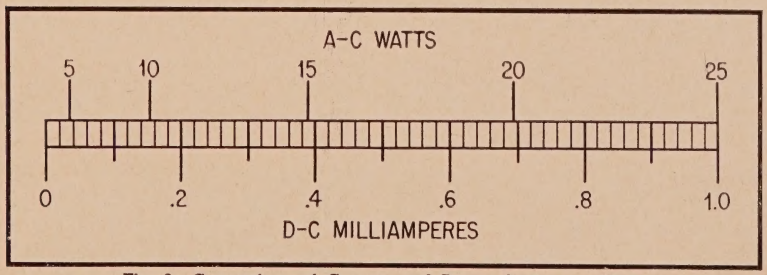
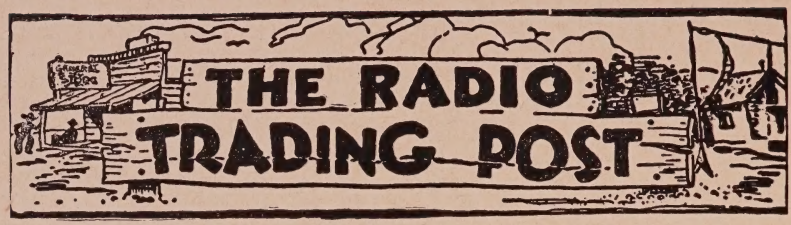


Fig. 8. Comparison of Current and Power Scales on Meter.



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SELL OR TRADE — 2 ea 100th (Eimac) 200 receiving tubes, short and MU checked. P.P. $25; USA BC 455 original. O. Hager, 102 Ravenna Ave., White Sands P.G., New Mexico.

TRADE — Argus 3.5-50mm Centar ln; Regency 600 UHF converter; 7EP4 tube; BC-458; R28-ARC5; SCR-522; ARB rcvr; Bendix TA-12D xmitter; all good. Prefer 6 meter gear but will consider anything. Make offer. Roy Crocker, Carbondale, Pa.

FOR SALE — Auto radio from 1939 to 1957 to fit to a T, all set. DeMarco's Radio TV Shop, 193 Pine St., New Haven 13, Conn.

FOR SALE — Ham station with less than 150 hours operation — B and W 5100 xmitter, spare final tubes, $330; HRO-60 rcvr speaker, crystal calibrator, 7 coils A to F, and AD, $450. Both $760. John E. Donnelly, 111 Paseo de la Playa, Redondo Beach, Calif.

FOR SALE — Binaural 24 Cook used records cost $5.95 each, lot postpaid, $21; Livingston Binaural Arm two GE RPX041 pickups, $22. No listing of records. Eugene Roy, 5 Hillside St., Haverhill, Mass.

SELL OR SWAP — 18 volumes Sams Photofacts in binders. Number 51 through 230. Also Precision E-200C marker generator. Sams $10 per vol., as set, or interested in Lampkin frequency meter; Precision generator, $50. Signalab Radio, 375 Berkshire Ave., Bridgeport, Conn.

FOR SALE — Eico 625 tube tester and picture tube adapter completely wired, in excellent cond., $38. Victor Dafchik, 267 Hillside Ave., Buffalo 18, N. Y.

WANTED — S-20R rcvr; Jap mike A1WA-M18: 304TL tubes. Will sell 4-125A tubes, BC-625 xmittors, BC-683 rcvr. E. L. Felder, Tylertown, Miss.

FOR SALE — W.E. 10 outfit; Kolster power cone reproducer unit type A signal corps U.S. Army hetrodyne BC 104A 300 to 500 meters, perfect Magnavox 80 dynamic speaker. Harry A. Bremer, 43 Washington Ave., Lake Hiawatha, N. J.

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FOR SALE — Dynavox 3-speed portable record player; comb. telegraph key and battery; album of Ameco code records 1-15 w.p.m., excellent cond., $22.50. Jack Himelfarb, 6402 24th Ave., Brooklyn 4, N. Y.

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FOR SALE — 20 Sams Photofast binders, excellent cond., $30. Wilton Radio Service, Greenfield, Ill.

FOR SALE — 30-50 Mc LINK 50-UPS xmitter, built-in 9UAR rcvr, type 1890 remote control unit, companion mobile station 15-UBX xmitter, 8UA-DC rcvr, remote control. Installation and service manuals. Stephanik, 504 Grace Ave., Garfield, N. J.

SELL OR TRADE — Sickness is causing me to dispose of my test equip., tubes, and parts. Will trade or sell for Hi-Fi equip. or tape recorder. Paul Horlander, Box 207, Tell City, Ind.

FOR SALE — Riders vols. 1, 2, 4-18, $5 each, or $75 for all; RCA Jr. VTVM, $25. McCann Radio, Cobden Ill.

FOR SALE — Electro Voice 3000 TV booster, tubes, 4 extra new tubes, uses 4 6J6's, automatic switch when TV is turned on. $12.50. Want TV tower such as Adprodco. James Littig, Kasota, Minn.

SELL OR TRADE — 12½" Raytheon console TV with new picture tube; l. n. tape recorder 3¾, 7½ and 15 rpm. Want 35mm Leica or similar camera in good cond. Larson's Radio Service, Madison, Minn.

FOR SALE — Books: Radio Operating by Nilson and Hornung; Mathematical Tables by Hodgman, $1 each; Audel's Radioman's Guide covering Theory, Construction and Servicing including TV Electronics by Anderson, $2.50. FOB. V. Grey, 121 Seville, Ormond Beach, Fla.

FOR SALE — Audio, Hi-Fi, and broadcast components. S. Friedland, Apt. J1301, 568 Grand St., New York 2, N. Y.

FOR SALE — Mahogany cabinet with panel cutouts for tuner, preamp., amplifier, changer, VU meter, 16" turntable, misc controls. Metropolitan only, $60. F. York, 114-38 196 St., St. Albans 12, N. Y.

FOR SALE — Radio Shop in thriving community corner location, drive-in facility, auto radio 3-phase 130 ADC 1½ BRM, dwelling exceptional for radio-TV man or parts outlet, $8,700 down, $2,500 clean stock, $30,000. Newport Radio Supply, 258 SW Coast Hiway, Newport, Ore.

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FOR SALE — Perfect Johnson Ranger E-V664 mike stand, $250; 3 Eimac 4-250-A, $15 each; KW power supply components, $25; Garrard RC 80, base and GE cartridge, .001 diamond stylus, $60. M. Molyneux, 2101 Oakmont Ave., Anniston, Ala.

TRADE — Radio City, 808A combination VTVM vacuum tube, CRT tester and reactivator, nearly new, cost $99.50. Want unfinished complete kits in good condition and equivalent value. Prefer Precise, Knight or Heathkit. Kelly Wayne, Box 37, Omar, W. Va.

WANT — Pro tape recorder; Collins rcvr; 16mm equipment, 20-meter beam tower controls; have unused RCA TV camera; Metco type 4E metallizing gun. Leo Meister, 321 River Rd., Nutley, N. J.

SELL OR SWAP — Like new National MB150 and MB40L tanks, RCA color course, l. n. Simpson 100 UA meter 10 UT 1000 v. filters, GE clock radio. Want sig. gen., scope, test equip. H. Cohen, 1975 83 St., Brooklyn, N. Y.

FOR SALE — Precision resistors of various values and quantities; W.W. long and short shaft pots; 2A and 500A selenium rectifiers; Jackson 637 tube and tester. Need minor service. J. Carroll, 3215 Philmont Ave., Huntingdon Valley, Pa.

SWAP — Portable Corona typewriter, with W.U. type (all capitals), needs pullback cord; pair 5HCT CTL trans., 5 lbs. ea., 55/ 90 VAC; Clavioline, complete, in carrying case. Need tape recorder, Hi-Fi, TV tubes, equip., or ?? E. Durran, 25 S. Serven St., Pearl River, N. Y.

FOR SALE — Heathkit O-10 scope, T-3 sig. tracer, C-3 condenser checker, SG-8 sig. gen., TS-4 sweep gen.; Eico 625 tube tester, all assembled, perf. cond., with probes and instructions, $165. Charles E. Witherell 108 Virginia Ave., Jersey City, N. J.

FOR SALE — Browning Lab. RJ20 AM-FM tuner and Thordarson T-32W10 amp. with instruction manuals and new spare tubes, like new. Worth more than $100 asked. C. W. Gotherman, Box 181, Palmerton, Pa.

FOR SALE — Perfect Pentron HF-400 tape recorder, $160; Eicor 115, $40; 17" professional disc recording lathe, 2 feeds, $100; Variac, type 100-R, $35; RCA 25-watt amplifier in attractive cage, exc., $35. John T. Moore, Box 63, Seneca, S. C.

SWAP OR SELL — Like new tape transport mechanism, double-track, separate erase-record; numerous xmitting tubes. Want transistor portable radio, or binoculars. C. A. West, 148 W. 8th Ave., Roselle, N. J.

WANTED — For cash. Used communications rcvrs, Hallicrafter, National, etc., mechanically sound but electrically inoperative. Send description, age, condition and lowest price acceptable. John A. Kimm, 934 Judson St., Evansville 13, Ind.

SELL OR SWAP — Ham gear, tubes, xformers, capacitors, meters in various ranges all kind of parts, CQ, QST and Radio magazines. Arthur Johnson, 29 Boone St., Bethpage, N. Y.

WANTED — Radio and Electrical experimental supply catalogs and booklets published before 1921: Electro Importing Co.; Adams-Morgan; Newark; Wm. Duck; Volt-amp Co.; Carlisle-Finch, etc. Delbert Henninger, 246 Jefferson St., Tiffin 12, Ohio.

WANTED — Weston 301 meters in any cond. Will trade tubes, radio or TV parts or cash. James Fred, Box 54, Russiaville, Ind.

FOR SALE — Assorted radio and TV repair parts including tubes. Cheap. Want TV projection system. Carrol Davis, Walnut, N. C.

FOR SALE — Eico 360 TV FM sweep generator, best offer over $20; Heathkit T-3 visual-aural signal tracer, best offer over $15. Herbert Piller, 451 Thieriot Ave., Bronx 72, N. Y.

FOR SALE — RCA 813's, $7.50, 832A's, $3.50, 829B's, $7; Measurements Corp. SG61-U sig. generator, $85; Bendix TA-12 xmitter, all band rig, unmodified, $35; BC 221 AH, complete, $65. Bill Slep, Ellenton, Fla.

FOR SALE — QST 1946 through 1956, CQ 1946 — 1956, R9 Sigs, Dec. 33 to Dec. 35; Radio, Dec. 33 to 41; various copies of Everday Engineering; Radio News; ARRL Handbooks 41 and 48. Charles Lohner, 157 Logan Ave., Bedford, Ohio.

SELL OR TRADE — HQ129X communication rcvr with built-in crystal calibrator, $100 FOB. Want 12 v. mobile gear. Murray Cohen, 2078 Wallace Ave., New York 62, N. Y.

FOR SALE — Improved Heath AT-1, modified per Oct. '55 QST, incl. relay and 2 xtals, novice xtals if desired, $25. Paul Van Nostrand, 1204 Stewart Ave., Bethpage, L. I., N. Y.

WANTED — Hallicrafters S-29 rcvr. State cond. and price. Frank Schwartz, 2400 West End Ave., Nashville 5, Tenn.

TRADE — All new TV tubes, RCA, Tungsol, etc., on list basis. Need good 8mm turret camera and lens. Prefer Bolex, Revere or B & H. T/Sgt. Snow, 55th Air Rescue Sq:. Box 104 APO 23, N. Y., N. Y.

FOR SALE — Eldico AT-1 antenna scope and TVD-62 filter; quantity 8mm and 16mm movies, American Flyer S-gauge trains and accessories. Make offer. Joe Newberg, Stone Rd., Lexington, Ky.

WANTED — Sweep gen.; marker gen.; scope; pocket voltohmeter for cash or trade Solar cond. tester; Simpson 260 tube tester; misc tubes and parts. Eugene Guerrazzi, 1441 Overing St., Bronx 61, N. Y.

WANTED — Surplus resistors and condensers standard TV types for cash. D. Ramirez, 103 W. 89 St., New York 24, N. Y.

FOR SALE — 5-tube 6 v. Chevrolet radio for under dash mounting, push buttons, built-in speaker, excellent cond., $10 fob. William A. Thoma, 139 S. Delmar Ave., Dayton 3, Ohio.

WANTED — TBY - 1 vibrator pack and Gonset VFO. Will trade complete aquarium setup or cash. Scott Hartman, 3029 Cavendish Drive, Los Angeles 64, Cal.f.

TRADE — MBF xceiver; Bendix TA-12D xmittr; RAX 1(2) rcvr.; 1.5-9mc with Dynamotor and 28v PS; ARB rcvr.; BC-455 rcvr. Want 75-100 w modulation xformer and any gear to plus value. Make offer. R. Crocker, 38 N. Church, Carbondale, Pa.

FOR SALE — Industrial TV 1T-133A UHF. automatic booster in original case. $15.; postpaid. Edwin Larason, Alexandria, Ohio.

FOR SALE — —National HFS rvvr.-converter less power supply 27 mc to 250 mc excellent cond. $75. express collect. C. J. Gerbracht, 411 Shenley Drive, Erie, Penna.

FOR SALE — 1949 Mercury car radio, best offer, also, AM radio sets. Need old Supreme radio manuals. R. M. Massey, 423 Monroe Street, Philadelphia 47, Pa.

SELL OR SWAP — ATR inverter 110DC to 110AC 150 w perfect $40. Meissner 8C FM tuner with cabinet, $19.50 or trade for test equipment. Stanley Buckwalter, 64-41 Saunders St., Rego Park 74, N.Y.

WANTED — Recent issue; Professional TV Servicing course companion kits desirable, but not necessary. Modern Electric, 117 E. Bellville, Marion, Ky.

WANTED — Good FM tuner with AFC, etc. (no kits). Also interested in "in-set" capacitance checker. State lowest price. Have 2 microphones, T-17 and Electro-Voice 915 with 8" desk stand, all chrome Meissner 8-C FM tuner. C. Gabler, 1307 Merriam Ave., New York 52, N. Y.

SELL OR TRADE — Hickok 288X signal generator with instruction manual. Need adding macine or cash. John T. Wisniewski, 15801 Loomis Ave., Harvey, Ill.

FOR SALE — BC 611 Walkie-Talkies with batteries, reconditioned 1941 Chrysler radio supplied for 6 or 12 v operation. Best offer cash or cash plus mobile 2 meter xmitter. E. K.Harkness, 777 Bryant Ave., Winnetka. Ill.

SELL OR TRADE — Webcor 3-speed automatic phonograph, new needles, $30; Crosley AM-FM radio, like new, $25; Trav-ler 3-way portable, $12.50; trade on test eqquipment, latest models, guaranteed excellent cond. J. Kolocotronis, 751 Syracuse, University City 5, Mo.

SELL OR TRADE — RCA TV Pict-O-Guide 3 vol; Rider's Tell-A-Fault 2 vol $15.; Heathkit VC2 Voltage Calibrator $8. Need Rider's Radio and TV manuals. W. G. Wright, 123 Putman Ave., Freeport, L. I. N. Y.

WANTED — Gardiner automatic tape sender. Complete, must be reasonable. Carl D. Shpiar, OTRS. 241-Ft. Snelling, Saint Paul 11, Minn.

TRADE — National NC-240D receiver in good condition, for B & W 51SB SSB exciter in like cond. Other ham parts to trade. Bill Grebe, 518 West Ninth Street, Loveland, Colo

WANTED — Sylvania publication, "How to Service Radios with a VTVH;" Also Gernsback library books No. 39 and earlier. John Rowan, 15 Oliver St., Brooklyn 9, N. Y.

SALE — Heath SG-8 signal gen. L.N., shematics, instructions in original shipping carton. $17.50 FOB. Ben DiGennaro, 3019 N. Hemberger St., Philadelphia 32, Pa.

WANTED — Replacement transformer for the 600 V supply in Temco GSC-250 transmitter. Original transformer is Kenyon S-17769. Primary 230 V, Sec. 700-0-700. State price and condition. V. Barker, Woodside Dr., Freeport, Ill.

SWAP — Motorola VT71, table model TV with schematic, excellent outward appearance but needs work. Want tape recorder. Al Agosta, 86-48 112th St., Richmond Hill, 18, N. Y.

FOR SALE — Mallory TV-101 converter and P-2 TV Booster Telekit. Both in good condition; $10 each. Lawrence Lechtreck, R-1, Box 16, Creve Coeur, Mo.

WANTED — Color TV chassis, and CRT, in working condition, reasonable, also 14" portable TV. Ken's TV Shop, 1123 Montello St., Brockton, Mass.

WANTED — Heathkit GD-1B Grid Dip meter with instructions and schematic. William Sharkey, 42-66 Phlox Pl., Flushing 55, N. Y.

FOR SALE — GE RPX-061 "Golden Treasure" cartridge, original one mil diamond stylus with less than 500 hours playing time. $6.00. Hal Magargle, 38 Bluebird Dr., Syosset, N. Y.

SELL OR SWAP — Auto sets Westinghouse meters, exchange lists. C.B radio & TV 1816 SW 11 Terrace, Miami, Fla.

SWAP — For Heath VFO or equivalent Millen R9'r with coils. M. Goodman 2621 Burns Pl., Union, N. J.

WANTED — Schematics for Bogen EX-35 amplifier and Bogen E-1620. Will pay $1.50 each. Want good silent or sound 16mm. projector, also outdoor speaker stands. John Arnold, Wilson St., Bluffs 3, Ill.

WANTED — 3 KP4 picture tube, must be in perfect cond. and low priced. For Pilot TV set. Regional purchase preferred. Roger J. Morey, 441 Parkwood, Ann Arbor Mich.

FOR SALE — NRI Radio-TV course 65 books no kits. In good condition $15. Readrite, 430 Tube Tester $5. J. Bell, 18 Delaware Ave., Paterson 3, N. J.

FOR SALE — Webster 50-w PA amplifier, 12 new tubes including 4-6L6, $50.; Electrovice V-1A velocity mike, $25.; desk mike stand, $2.;Amperite musical instrument mike, $5. Shipping charges additional. Mrs. Carolyn Borgen, 3007 Rice Ave., Rockford, Ill.

FOR SALE — S85 Hallicrafter rcvr. new cond. J. Meade, 147-33 10th Ave., Whitestone 57, N. Y.

FOR SALE — Two 813's, RCA $8 each, 2 for $15. E. Videika, 33-40 89th St., Jackson Heights, L. I., N. Y.

FOR SALE — Sterio Realist 35 mm with case and flash, like new $100.; RCA AVT-49 transmitter $20.; 75A1 with 3kc filter, speaker and Viking II with VFO $495. Will not sell separately. Cash-no trades. K. Miller, 14979 Lacumbre Dr., Pacific Palisades, Calif.

FOR SALE — 3 speed Belt-Driven 12" aluminum turntable, synchronous motor, with B-J Pantograph Arm, $75.; Approved A-800 Preamp control unit, $25; Pickering S-120M Cartridge, $5. All excellent cond., priced fob. Donald P. Bagren, 417 N. Winnebago, Rockford, Ill.

FOR SALE — Gonset communicator 2 meters $150. Masco Wireless Inercom: Remote controls for RCA TV set $17 postpaid.for unit (motorized) or swap for FM set or tuner. R. Lack 2029 Bradly, Chicago 18, Ill.

FOR SALE — Super pros-Less power supplies $50.; HRO's $75.; Motorola FM 30-42 mc receivers $45.; Link 30-40 mc receivers $20.; GE tube tester $25. George Pasquale, 9421 Thornhill Rd., Silver Spring, Md.

WANTED — Revere T-700D or TR-800D tape recorder. Eugene Kon, 1516 Broadway, Buffalo 12, N. Y.

SELL OR SWAP — Crosley short wave radio, Mopar 1950 Plymouth radio, 3-way portable radio. Or will pay cash for office (desk type) typewriter and for magazine load 8mm movie camera preferably with 1.9 lens. E. Pluchino, 112-29 206 St., Queens Village 29, N. Y.

FOR SALE — Complete AC vacum tube millivoltmeter constructed from Feb 1951 C-D Capacitor. Cabinet, schematic, instructions shielded cable test leads, Scale ranges: 0-20 to 0-200 mv 0-2, 0-20, 0-200 v. Asking $25. Will ship COD William H. Henshaw, 46 Front St., Tarrytown, N. Y.

FOR SALE — Riders Manuals 1-5 abridged and 6 to 13 incl. Make offer. Also Neon Sign "Auto Radio Repairs" with transformer Prefer local buyer for sign. C. Pooke, 300 W. Apsley St., Philadelphia 44, Pa.

FOR SALE — Approx. 50 TV sets, 7 to 21", some working, some not. Local only. See and make offer for one or all. B. J. D'Adolph, 1877 McKinley Ave., East Meadow, N. Y.

SELL OR TRADE — 500 w power supply, 6 meter transceiver, novice 75 w. trans. and rcvr. complete with key, crystals and phones, 3" scope, 2 meter trans., 150 w modulation trans. Crystals 5 to 9 mc for ? ? "Mike," 4046 Iroquois St., New Orleans, La.

FOR SALE — 1-222A signal generator & freq. meter, range 150-230 mc — —8-15 mc. Make offer; Motor, turntable, pickup arm & cartridge for Fairchild Language Master in original mounting. FOB $10. Want late transocean-Zenith. M. J. Douglas, 1401 Amador, Concord, Calif.

FOR SALE — Eico 470 7" scope, never used, $60; Granco Converter, $10; VTVM Triplet 666HH, excellent condition. $10. Joseph Weider, 614 Roseland Ave., Pittsburgh 14, Pa.

AVAILABLE — Exp. 1st cl .phone "Tone" operator for permanent B'dcst xmitter work. Age 28, married. Phone or write E. J. Mick, 515 Buxmont St., Philadelphia 16, Pa

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FOR SALE — Dumont Tel-eset RA-103 $25, very good cond.; 50 pcs. micas from 5 MMF-to-.001 guaranteed perfect standard brands never used $2.50 M.O. Eugene Giroux, 735 Park Ave., Hoboken, N. J.

FOR SALE — Mallory TV-101 UHF tuner, never used. Make offer. Waite Radio, Wellington, Ohio.

WANTED — For cash standard brand tubes and parts that are in original cartons. Any amount bought in prices low enough. Garvis McKeen 109 Mallory Dr., La Grange, Ga.

SWAP — Hallicrafter 150 watt fone and CW, including all coils for Gonset 2 meter communicater. Have Heathkit scope like new $35;VTVM $15, Century in ckt condenser checker $12.50. John A. Kakstys, 18 Hillcrest Ter., Linden, N. J.

FOR SALE — Ampex 600 tape recorder in new cond., $398.95 or best offer. Hi-Fi tape recorder to meet professional standards. W. Sahakian, 31 Franklin St., Chelsea 50, Mass.

FOR SALE — Garrard RC 60 changer, G.E. reluctance cartridge 78 rpm, excellent cond. $23. Vincent Pellettieri, 5523 31 Ave., Woodside 77, L. I. N. Y

SELL OR TRADE — Receiver pollce alarm FM. PR 8-163-152MC $25. (cabinet chipped) German microscope 450 power with ABBE condenser in sleeve, coarse and fine focus. $35. or trade for Jap 16 x 15 binoculars. Wm Wozniak, 5327 Daley Pl., Gary 5, Ind.

FOR SALE — Bogen R701 FM-AM tuner-preamplifier. Unused but slightly shelf-worn front panel. $75. H. L. Wylie, 75 William, Worcester 9, Mass.

FOR SALE — Unused Hallicrafter SX99. Jim Clemens, Easton, Minn.

WANTED — Internal Growler for Electric motor testing. M. Georgion, 1684 Grand Concourse, New York 57, N. Y.

FOR SALE — NRI radio-television course in binders $15; also Rider Vol 1 and Supreme diagrams reasonable. W. L. Bowden, 123 Grove St., Dexter, Me.

POSITION WANTED — Experienced Radio-T.V. serviceman wants work in or near Huntington W. Va. or Pittsburgh, Pa. J. W. Landon, Wayne, W. Va.

FOR SALE — RCA cathode ray oscillograph type TMV-122-B. Fair cond. Best offer. R. E Bauman, Box 614, Milton, Wis.

FOR SALE — Jerrold DSA-132 antenna preampli. -Hi and Lo band VHF coverage. Best offer Edward G. Harjala, Box 208, Copper City, Mich.

FOR SALE — Webster wire recorder, Federal enlarger and photo accessories, Radio parts and tools, coils, hardware, etc. write for list. G. H. White, 449 Wellington Rd., Mineola, L. I. N. Y.

POSITION WANTED — Have some education and experience in electronic servicing. Want opportunity to prove myself. Don Recktenwald, 345 E. 58th St., Seattle, Wash.

WANT — Schematic for Radolek PA amplifier of 1934. No serial or chassis No. Tube complacement: 1 unknown, 2, 57's, 1-56, 1-53, 1-5L3, 2-6B5's. Roy W. Griffith, 303 W. 6th, Hays, Kan.

FOR SALE — Complete 120 w phone,cw xmitter, bandswitching 80-40-20-15: Bud cabinet, baluns, antenna relay, VFO, No. 950 mike, speech clipper, Bud variable low-pass filter. Prefer local. Bargain Zimmerman, 3701 Webb Ave., Bronx 68, N. Y.

FOR SALE — GE dynamotor, input 5.6v at 35 amps, output 420 v at 280 ma, $7 postpaid. Donald Sypek, 706 Court St., Utica, New York.

SALE OR TRADE — Monitoradio FM 30-50mc rcvr. for 6v mobile use, converted for 12 v, perfect condition, with orig. manual. Want cash or Gonset 2 meter FM converter covering up to 156 mc. Martin Goffe, 1011-44th St., B'klyn 19, N. Y.

SELL OR SWAP — 60 w plate modulator; 40 meter xmitter, 70 w; VR pwr. supply, good cond., K. Fischer, 41 Woods Ave., Bergenfield, N. J.

WANTED — Schematic diagram or instruction manual on Browning Synchroscope P4-E. Name your price. John Jordan, 74 Richelieu Terr., Newark 6, N. J.

FOR SALE — Back issues QST 1932 to 1955, $1.50 per year prepaid; R-28-ARC-5 rcvr., makes good two meter rcvr., $10. L. M. McGee, 501 E. Wyatt, Herington, Kan.

TRADE OR SELL — Books on Radio, TV, Math, Radar and Engineering Drawing. Write for list. Need sig. tracer and capacitor checker. Sommers, 865 W. 180th St., New York 33, N. Y.

FOR SALE — Small stock of radio and TV tubes, parts and testers. Reasonable. G. E. Tripp, 1312 11th St., Rock Valley, Iowa.

FOR SALE — Hickok 620 TV linearity pattern generator. John L. Werner, Middleport, Ohio.

WANTED — Midwest CRT repair instrument, for cash. Have for sale Metermatic 25c Coin Meters, perfect, $3.50 each. Kay's TV, Rt 2 Box 184, DeLand, Fla.

FOR SALE — Crestwood tape recorder and amplifier Model 400 and 401, excell. cond. $195. Sylvia Epstein, 1611 Placid St., Philadelphia 15, Pa.

FOR SALE — Closed circuit 100A TV camera, tripod, dolly, voltage reg. and connectors, exeellent cond. Also has 1", 3" and wide angle lens on turret, $2,000. or best offer. J. W. Parker, 1014 Eriel Ave., Torrance, Calif.

FOR SALE — Carter dynamotor 6 v. in 420 out at 280 mils, $20; GE dynamotor 6v in 650 out at .2375 mils, $20; 36 Master Mobile base section and 20 meter coil, $7. M. Garber, Box 522, Alexandria, La.

FOR SALE — Slightly used RCA TV Eye; 2 RCA cameras; Hallicrafter S-38B. Want Police-alarm 32 to 50 mc; Dynaquick tube tester; schematic for Relaxacizor. Upp Radio & TV, Salida, Colo.

SELL OF SWAP — Robot 35 mm double frame camera with F2 lens. Accessories, and gadget bag for $100, Viking Mobile xmitter kit or assembled unit, or comparable mobile equip. Earle S. Pittman, Hedronsec, 3415th Tech. Tng. Gp., Lowry AFB, Colo.

FOR SALE — Precision 912 tube checker, good cond., $18; Riders Vols. 1-21 incl. good cond, $90; Large qquantity radio repair parts and tubes cheap. H. M. Cowles, 44 Hill St., Salamanca, N. Y.

FOR SALE — Hickock 288X tor Sprague TO-4 and good VOM 20K-V. Sanfords Electronics, Box 96, Reedsburg, Wis.

SWAP OR SELL — Unused 17 jewel watch for man or woman; portable typewriter; photo-camera, high quality. Want sig.-tracer, condenser checker and capacitor, scope. G. Dukhov, 605 W. 137 St., Apt. 53, New York, N. Y.

SWAP — Stancor 40 P xmitter for 100 w xmitter any make in A-1 cond. Jim Jackson, Gen. Del., Clinton, Okla.

WANT — Information on old Grebe Superhet in model 307 line, service data and schematics if available. Frank Nelson, 2033 N.E. 52nd Ave., Portland 13, Ore.

FOR SALE — Riders Trouble Shooting Manuals Vols. 2-6 and 13 with Index; $35. for lot. Julie's TV Service,, Placerville, Calif.

FOR SALE — Hickok 325K wired and perfect, $59.95; B and K. 350, $42.95; Sams folders—12 for $15; RCA 10" TV working, $19.50, FOB. A Campbell, 78 Main St., Dublin, Pa.

WANTED — Chassis No. 61, RCA 4T101 14" TV. No CRT or tubes, tuner must be in good cond. State Price. Prefer metropolitan area. John Rosol, 28 Winans Ave., Newark 3, N. J.

FOR SALE — Electrovoice 636 mike; GE-A1-900 record compensator; RCA tubes, astatic pickup arm-FLC, output trans. J. Holloway, 1421 Arch St., Philadelphia 2, Pa.

SELL OR TRADE — 13h at 1 amp choke; 3-CD .005 mfd. 8000V-30 amp at 1 mc mica; 5-Faradon .004 mfd 5000v 9 amp at 1mc mica; 1-2 mfd 5,000 v Dykanol; NC-33 $25. Need surplus gear. Dave Hunter, Box 277, Centerville, Mass.

WANTED — Portable or pocket-type transistor radio; ½" drill chuck; ¼" drill access—angle drive, speed reducer,etc.; Fawcett's or Science and Mechanics "How-to-do-it" handbooks. State price. Have coin collection. Leo Adas, 1842 N. Keystone Ave., Chicago 39, Ill.

FOR SALE — RCA 170-A audio chanalyst, very good, all cables and instruction book; Precision ES 500 scope 5", like new. Best offer. Robert J. Schaack, 4661 N. 90th St., Milwaukee 18, Wis.

FOR SALE — Sam's in binders 1 thru 4 and 8 thru 16 and some folder sets in envelopes; all in fine cond. $100. FOB. Detroit. Harry Kraus, 21622 Trombley, St. Clair Shores, Mich.

FOR SALE — Pentron 9T3C tape recorder with mike, tape, etc, $50; Eico sig generator, $10; Millen exciter, $20; Assorted microamp and milliamp meters, $1.75. Robert Faeth, 4 Lakeview Dr., Emerson, N. J.

FOR SALE — NRI Radio course, 75 manuals in 3 binders, service manual, no kits, $25; Eico 315 sig. generator, professionally wired, $38. H. E. Wood, 1034 Pioneer Rd., Lansdale, Pa.

SELL OR TRADE — Crosley TV converter, model DU-UHFP, 117 v AC, never used, sacrifice $20, or trade for 8mm film splicer-editor viewer. William Jung, Jr., 4 Himmelmann Pl., San Francisco, Calif.

FOR SALE — ARC-5 Transmitter, $20; SX-28 rcvr, $100, both excellent cond. Local only. Alan Birnholz, 634 High St., Newark 2, N. J.

WANTED — Copy of "Television and Radio manual—Everybody's Television and Radio Handbook," published by Popular Science about 1951. State Price. Raymond Fisher, 627 Fallowfield Ave., Charleroi, Pa.

WANTED — LP-21-A loops and all components of SCR-269-G ADF set, also SCR-522 xceivers w/o power supply. Advise condition and price. Hendrickson Aeromar, Inc., Building 116, Broward County Int'l Airport, Ft. Lauderdale Fla.

FOR SALE — BC-453-B Western Electric rcvr. 195kc to 550kc, $15. or trade for T-601 Pilotuner. Charles Leigh, 162 Passaic St., Trenton 8, N. J.

FOR SALE — 1947 or 48 Olds. radio, good cond., $7.50; Pix Tube 10FP4 $5.; chassis and Cabinet of GE 810 TV set, $10; Plate Transformer, 4,500 v CT at 250ma., $20. Ray Radio, Box 595, Lancaster, Ky.

FOR SALE — 5-15mfd-1000 v. cond.; 10-10mfd-1,000 v. cond; 10-4mfd-1,000 v. cond.; 20-10mfd-600 v. cond; Best offer on any or all. M. Levine, 2244 E. 27 St., Brooklyn 29 N. Y.

GOING OUT OF BUSINESS — Precise 300W 7" scope, like new, $139; Millen 90651 Grid Dip Meter, $49; GE mfd. oil capacitor, 2500 v., $15; B and W 75 w Junior coils: 80, 20, 15, 10, post-paid 50c. Felix Orlowski, 4045 N. Lawler, Chicago 41, Ill.

SELL OR TRADE — Like new tape recorder; Raytheon 12½" TV with new picture tube in good operating cond. Want good 35mm camera or ? Larson's Radio Service, Madison, Minn.

FOR SALE — Elements of Radio Servicing, Marcus-Levy, $4.25; Math. Essentials to Electrictiy and Radio, Cooke-Oleans, $3.50; Understanding Radio, Watson-Welch-Eby, $5.; Principles of TV Servicing, Rabinoff-Wolbrecht, $4.25; TV servicing, Heller-Shulman, $5. Like new. H. A. Johnson, 8218 Tenth Ave., Brooklyn 28, N. Y.

FOR SALE — UHF converter, Mallory TV-101, $10. less 6AF4 or 6T4 input tube (or will furnish at cost), shipping prepaid. Prentiss B. Alger, 131 E. Cedar St., Elizabethtown, Pa.

SELL OR TRADE — Precision Scope ES-500, Heathkit 0-10 scope and TS-3 sweep alignment; Supreme 582 sig. generator and frequency modulator. Want all-band portable, also TV portable. C. F. Albertoni, 2629 Paxton Ave., Akron 12, Ohio.

WANTED — Supreme Radio Manuals to Vol 14. C. W. Low, TV and Radio Service, McDonough, Ga.

WANTED — One or two Gordon ROTO-BEAM Rotators complete with Anten-A-Cator Station Control box. Must be reasonable and in good working cond. L. K. Rush, P. O. Box 1418, Jackson, Tenn.

WANTED — Rider's TV Service Manual, Vol. 13. J. T. Farley, 140-35 58 Rd., Flushing 55, N. Y.

FOR SALE — Mobile amp. system, 6vDC or 117vAC, with turntable, mike, 2 reentrant speakers, floor stand, cables, etc., $70; 5 RCA 45 w driver units, $3. each. Paul Streeter, 111 Los Gatos, Vallejo, Calif.

SWAP — 30 w Ultra Linear Amp., separate power supply; KT66 output; Acrosound output transformer; Lionel train equipment, for good communications receiver or 522 xmitter-receiver converted to AC operation. Local preferred. Chales Heichlinger, 16 Lincoln Rd. North, Plainview, L. I. N. Y.

SELL OR SWAP — Hallicrafters S22R 4 band rcvr. Any reasonable offer accepted. William M. Collings, 5 Johnson Rd., Arlington 74, Mass.

FOR SALE — Riders 1-7 9, 10, 14, and Sam's Photofacts 1 to 41 in five binders, $25. all in good cond. except Vol 1 shows wear. J. Homer McMunn, 354 Highland Ave., Cambridge, Ohio

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SELL OR TRADE — Supreme 562 audolyzer, like new, probes and instruction manual, $35. plus shipping. Chas. A. Huddlestun, 826 Chester Ave., E. Liverpool, Ohio.

WANTED — Will pay $2. for Instruction manual for Hickok Navy model OBQI, VTVM. John G. Filomeno, 7419 13th Ave., Brooklyn 28, N. Y.

WANTED — "Electrical Eperimenter" magazine for years 1913, 1914, and 1915. Any early radio hams with copies of these? L. I. Anderson, 1615 E. River Terr., Minneapolis 14, Minn.

FOR SALE — Altec-Lansing mahogany corner cabinet, Stephens 102FR 15" speaker cross-over and tweeter, $125.; University tiny mite mahogany cabinet; Jensen 10" speaker; Williamson amplifier KT66'S Ultra-Linear output tone control unit, $75. Lester Biwer, 612 N. Spaulding Ave.,Chicago 24, Ill.

FOR SALE — 16" Trans-Vue console TV, excellent, new picture tube with one year warranty, $60. cash. Droesch Radio-TV Service, Burkettsville, Ohio.

WANTED — Code practice machine with tapes, such as Instructograph. Indicate specifications, condition, and price. Albert Rosen, 1125 Circle Dr., Las Cruces N. Mex.

TRADE — Two VHF UHF TV converters Mallory R101 all-channel, and Sarkes-Tarzian UPT-1A for channels 14 to 46; University SA-HF 25 w PA driver, 90-10,000 cycles, all like new. Want hi-fi amplifier and speaker. Wm. McDaniel, 19 Sequoia, Wichita 8, Kans.

FOR SALE — C-D Inverter 110 v DC-AC, 150 w.-int; 250 w. cont., $18; 10" TV table model, $20; 3-speed turntable needs some repairs, $15; Precision tube tester table model series 10-12, perfect $60. Joe's Radio and TV, 229 E. 7th St., New York 9, N.Y.

FOR SALE — EMC Tape player, amplifier, speaker, cabinet $49; Bell phono attachment tape player, $9.95; Bogen FM tuner $34; two GE 12" speakers in corner cabinet, $14. J. C. Davis, 9014 N. Laramie St., Skokie, Ill.

FOR SALE — NCR 125, 1½ years old. Ser. No. 3430089, $125; loudspeaker optional, $15. Henry J. Orloff, 565 N. Alexandrio, Los Angeles 4, Calif.

SELL OR TRADE — Heath Q-multiplier kit, not wired and voltage calibrator. Swap both for Heath VFO, or make offer. Also want BG-34A keyer and tapes H. Buterworth, 2708 Gaither St. SE, Washington 21, D. C.

WANTED — For cash or swap, one copy each, Bureau of Standards circulars Nos. 120 and 121 issued April and July, 1922. Wesley W. Brogan, 306 Bethlehem Pike, Ambler, Pa.

FOR SALE — Heath TS-2 sweep generator, $10; GE ST4-A sweep generator inductor, $12; Philco No. 7053 pix tube checker, $10. Grottoes Electronic Service, Box 265, Grottoes, Va.

FOR SALE OR TRADE — 4 dozen 16" recording blank discs, professional quality. Kilowatt Final, 3-30 mc; pp 250th variable for Class A, B, or C. Built-in bias supply and all final coils. MB-150 Grid circuit. Want tape recorder or 7.5 HP outboard motor, used. Capt. R. D. Chedester, 112 Rosewood Dr. Hampton, Va.

FOR SALE — Taco Tenna-Top Boosters, for Channels 4 and 6 complete 3 pieces like new, $12.,plus postage. L. F. Mach, 402 No. 24 St., Omaha, Neb.

FOR SALE — 480 Genescope in perfect cond.—never used, cheap. Business dissolved. E. Nadosy, 9701 So. Francisco Avenue, Evergreen Park, Chicago 42, Ill.

SELL OR SWAP — Riders Vols. 1-18, $75.; Hickok RFO 4, 3" scope, $30.; Solar BQC -00001 to 70 mfd in circuit condenser tester $15; all in good cond. Need TV type sweep gen. V. D. Walker, 716 North St., Pittsfield, Mass.

FOR SALE — ARC-5 1-3, 3-6, 6-9mc with power supply on rack, speaker, $25. Tuning knobs, fone jacks, bfo switches and vol. controls installed. Excellent working order. V. Vine 362½ N. Main St., Canandaigua, N. Y.

SELL OR SWAP — Airline (Montogmery Ward) 30 w. mobile 6 v DC, 110 v AC, with Shure 710 microphone, 3-speed phonograph, in good working cond. $60. John Zaghis, 2402 11th St., Santa Monica, Calif.

FOR SALE — Hallicrafters TV parts including resistors, condensors, power transformers, knobs, flybacks and assorted cabinet parts. Inventory excess of $1,000. Make offer. Albert Mathias and Co., Box 391, El Paso, Tex.

WANTED — All-band communications rcvr, up to $40. Marilyn Shafran, 134 Patton Blvd., New Hyde Park, L I., N. Y.

WANTED — Antique telephones and telephone equip. Need tube line-up and battery connectors for Atwater Kent Radios, Models 20 and 35. H. Breed, Jr., Box 8662, Ensley Ala.

FOR SALE — Unused Raytheon 7JP4, in original carton. Arnold Ely, 2484 Michigan Ave., Niagara Falls, N. Y.

FOR SALE — Presto K-8 Disc Recorder, with speaker, factory modified for LP and 45 rpm recording. Has turnover cartridge playback arm, several sapphire cutters, unit and case like new, $125. F. Fox, Fox Electronics Inc., 711 S. 9th St., Richmond, Ind.

FOR SALE — UHF Channel No. 36 strips for standard coil and Zenith tuners, $4. prepaid; Sarkes Tarzian converter, $10. Bryan Service, 5346 Delor St., St. Louis 9, Mo.

FOR SALE — NRI Radio and TV course complete with binders, kits, and test inst. Donald Meek, 210 N. Rock, Sheridan, Ark.

FOR SALE — Latest Hammarlund HQ 140 X-Receiver with speaker, used less than 3 months, A-1 cond., $220. Plus shipping, will deliver within 50 miles. W. M. Miner, 8 Longview Ave., White Plains, New York.

TRADE — BC-221 frequency meter with original calibration chart for good amateur rcvr. Will consider BC 348, BC 224 or similar professional type comm. rcvr. Max B. Strauss, 4025 Wilmington Rd., South Euclid 21, Ohio.

FOR SALE — Like new Simpson 59AC v-meter 4½" square Bakelite case, single range 0-150 AC, $6. Postpaid. L. Wienreb, 151-9 34th Ave., Flushing 54, N. Y.

FOR SALE — Dumont 208-B scope, like new, $80; RCA AR-88LF rcvr, covers 75-540kc and 1.5 to 30 mc, $150; Gonset Noise Clipper, $5. Lester Harlow, 5901 Paul St., Alexandria, Va.

WANTED — Used sound equipment microphone stands: amplifiers, microphones, tape recorders, any cond., will accept if minor repairs are needed. Also intercoms and trumpets. J. T. Maza, Spring Valley Farm, R. 3, Bloomfield, Ind.

WANTED — Instruction Manual, Schematic Dayrad 381 tube tester, schematic for Ranger 6T. AC radio, Ainsworth Radio Co.; speakers Kolster K5 and Stewart-Warner magnetics; MR 80 Freed-Eiseman Radio. C. E. Peters, 2925 Apple St., Lincoln 3, Neb.

FOR SALE — 7.5Hy 650Ma Thordarson Choke $12; PE103A with ouput plug, $27; 2 BC645A, both for $27; Rotary beam inductive coupler, $5. E. Dudis, 273 N. American Blvd., Vandalia, Ohio.

WANTED — Cinema dip filter equalizer, other professional recording equipment. State cond., price, etc., Mark Novack, 157 Clark Road, Brookline 46, Mass.

SELL OR SWAP — Millen 90800 50 w. exciter-xmitter with coils for 80 and 10 meters, all cathode coils, tubes and instruction manual. Best offer. Herman Gross, 4909 N. 39th St., Milwaukee 9, Wis.

WANTED — Used Stancer P-6415 isolation testing transformer, or Merit P-3138 line voltage regulator transformer A1 good operating cond. State price. W. B. Jones Radio and TV, Carnesville, Ga.

WANTED — 110-220 v generators, belt-driven and self-contained for cash or trade, 1.n. hi-fi gear or tape recorders. State details first reply. Greenwich Specialty Co., Greenwich, N. J.

FOR SALE — Entire stock of 250 tubes; RCA, GE, Sylvania. List $592, your price, $150. for lot. Harvey's Radio Service, 200 Stonecliff Dr., Rochester 16, N. Y.

WANTED — Wireless and radio books, magazines, and catalogs prior to 1930; old wireless and radio components. Bob Middleton, 4612 Woodward Avenue, Rm. 504, Detroit, Mich.

SELL OR TRADE — Heathkits: AT-1 xmitter, and AC-1 antennae tuner. Two 40 m. and two 80 m. crystals, best offer over $35, or trade for hi-fi equipment. Lawrence Benjamin, Box 49, Hutchinson, Minn.

TRADE OR SELL — 2 BC457s; Heathkit bar generator; Eico 425 scope; Masco cascode booster; Pilot FM tuner, Heathkit sig. gen. Need tape recorder, 15" pm speaker; Guitar; 45rpm record changer. Perry Barger, Box 145, Graysville, Tenn.

FOR SALE — 4 Ohmite 25 w., 2500 ohm pots $1.20; 10 80 and 200 ohm 20 w. resistors $1.20; 10 bathtub conden. $1.20; 2 813 tubes, $6.50 ea. M. Kalmanson, 80 St. Marks Place, Staten Island, N. Y.

SELL OR TRADE — 15 w. PA system complete $69; GE Tunger battery charger, $11.50; 7EP4, $14.75; Packaging machine automatic tapeshooter $39; Record changer repair rack $7.75; Disc cutter turntable, $42. Stollman, 3003 Avenue X, Brooklyn 35, N. Y.

FOR SALE — Heath AR3 communications rcvr., .55-30mgs, A-1 cond, used 10 hours, $30 postpaid. Terry Philpott, Box 163 La Porte City, Iowa.

FOR SALE — 36 Sams folders 41 thru 275, $1 each or $25 for all,postpaid. K. Ferrin, 667 San Diego Ave., Sunnyvale, Calif.

FOR SALE — Lafayette console record-phono combination. Perfect cond., uriced right. Miss Domenica Masi, 54 Lake St., Belleville, N. J.

FOR SALE — Pair vocaline 465mc Citizens Band Transceivers Class B FCC approved, complete with 2 ground plane antennas and 60 ft UHF coax-cable 6VDC or 117VAC, $100. Hutton Radio and TV Co., Box 202, Dermott, Ark.

WANTED — Pentron 9T-3C or professional tape recorders, any cond. State make, model, age, price. N. F. Round 29 Elmwood Rd., Methuen, Mass.

FOR SALE — Meissner analyst solar capacity checker, Heathkit bar generator, and square wave generator, best offer. Graflex Strobflash 2 with batteries, $55. R. Van W., 412 Humboldt St., Rochester 10, N. Y.

FOR SALE — Complete TV home and auto radio service equipment and manuals, also test benches, fixtures and assorted stock. N. Y. City area preferred. S. Kramer, 9 Gables Rd., Hicksville, N. Y.

FOR SALE — Sylvania 140 tube tester, good cond., recent roll chart, $25. Will deliver in Atlanta area. H. F. Walton, 115 N. Madison St., College Park, Ga.

TRADE ONLY — 9 lb Weatherby .270 Magnum rifle, l. n., Mauser action French walnut stock, by Stegall. Weaver K-4 scope, Griffen and Howe mount. Dies for Pacific. Cost over $400. Want communications rcvr. of equal value. J. T. Ziliox, Rt. 2, Vero Beach, Fla.

FOR SALE — ½" drill, perfect. Need hi-fi equip. Charles Radio Service, 81 Warren St., Roxbury 19, Mass

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FOR SALE — Pilot table model T521 FM-AM, radio AC-DC $15. Locally only. Gerald Sobin, 376 E. 94th St., Brooklyn, N. Y.

FOR SALE — Sams Photofacts Vol. 1-36. Best offer. Crose TV, 102 N. Clifton, Park Ridge, Ill.

WANTED — 4401 Hi-Freq. horn N2B Crossover network. John J. Conroy, 2523 W. Willard St., Philadelphia 39, Pa.

FOR SALE — Viking Adventurer, wired, l.n. $45; Heathkit AC-1 antenna coupler l.n. $12; Both $55., FOB. B W. Southwell, 200 S. 7th St., Dixon, Calif.

WANTED — Motorola rcvr P-69-17 and xmitter T-69-20A power supply, control head, crystal for 31.900 antenna relay box, control cables, Microphone. State price and cond. Maurice F. Randall, Warner, N. H.

FOR SALE — 1000 VDC power supply for xmitter 400ma, 12 VDC at 2 amps and 12 VAC at 12 amps. three relays, tapped primary, worth $400 sell for $75. plus express. Thomas Valenti, 1539 Curry Dr., Lyndhurst 24, Ohio.

WANTED — Kaar FM-40X mobile rcvr. or like xtal controlled mobile rcvr. for 152-160 mc. J. McIntire, 39 W. Monument Ave., Dayton 2, Ohio.

FOR SALE — Bug code key, $10; Fisher 80-C master audio control unit, $85; Masco ten-station intercom; $25; Acousticon hearing aid, complete, $25; Sperti ultraviolet sunlamp, $15. All excellent cond. FOB. V. R. Hein, 418 Gregory, Rockford, Ill.

WANTED — Small mobile 10 meter xmitter, power supply, and converter. Bob Green, 924 Vinehire Rd., Cleveland Heights 21, Ohio.

FOR SALE — Gonset G-66 mobile rcvr. in orig. carton. Money order for $130. gets it, prepaid. Joe V. Wright, Box 1158, Rockport, Texas.

WANTED — Mobile xmitter, 15w or more, with 12v filaments, also 12v dynamotor 400v at 200-300 mils. Push-to-talk mike. Give cond. coverage, and price. R. W. Spradling, Box 871, Joliet, Ill.

FOR SALE — Riders Radio manuals 6-21 $50., Riders TV manuals 1-8 $12 each or $80 lot, shipping charges extra. Horowitz TV Co., 1775 East 17 St., Brooklyn 29, N. Y.

FOR SALE — Ideal communications rcvr. for novice or O.T. HRO-W with power supply, speaker and Q multiplier, $145. M. Goodman, 2621 Burns Pl., Union, N. J.

WANTED — Schematic for Jackson No. 103 dynamic tube tester, also instruction booklet. Peter M. Kady, Jr., 126 Magnolia St., Highland Park, N. J.

SELL OR SWAP — C-D Powercon, M-110T22 input, 110VDC, output, 110VAC, 225w. cont. $20. Ed Stask, 400 W. Cherry St., Shenandoah, Pa.

SELL OR TRADE — Precision E-400 sweep gen., comp. $70. FOB, or trade and pay difference toward good FM tuner. No kits. Donald A. Fangman, 16 Malvina Lane, Newark, Del.

FOR SALE — Radio and TV News Engineering edition, 1951-54 inclusive, $5. V. Johannes, 1541 Metropolitan Ave., Bronx 62, New York.

SELL OR TRADE — Bell and Howell 70-D Newsreel turret movie camera, 16mm, with 1" lens, $100; 500w. xmtr with Millen final, $250. Want Gonset 2-meter 12v. communicator. Mort Bardfield, 4 Brinsley St., Dorchester 21, Mass.

WANTED — Bud Code Practice Oscillator. C. L. Reynolds, 214 S. Elwood, Tulsa, Okla.

WANTED — Sound equip.: mikes, speakers, amplifiers, turntables, tape recorders, etc. Send all details. Al Reiners, Box 395, Hyannis, Mass.

WANTED — AM-FM tuners and 12 or 15 late model Co-ax speakers. J. Teitler, 9 Target La., Levittown, L. I., N. Y.

WANTED — NRI appliance repair course. State price and year. John Laflie, 6146 S. Kenneth Ave, Chicago 29, Ill.

FOR SALE — Dodge radio 1950; Gonset 2-meter converter; Sonar MB 26 2-meter trans. and MR 3 mobile 3 band rcvr; E400 sweep generator; 7" Motorola TV no tube; Weston 777 tube tester. A. Turturro, 146-26, N. Hempstead Tpke,, Flushing 55, N. Y.

SELL OR SWAP — Collector's item: 4 Western Electric 101-F's in perfect cond. C. T. Murphy, 1700 S. Main St., Burlington, Iowa

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FOR SALE — NRI Radio-TV course with multitester, $25; also radio magazines. Cheri's Radio-TV Service, 1865 15th St., Wyandotte, Mich.

TRADE — Clinton 2-band, 7-tube, magic tuning eye type superhet rcvr for sig. tracer. Robert J. Reidy, 1307 Nelson Ave., Bronx 52, N. Y.

WANTED — Precision made Electronamic tube tester. State model, cond., and price. Local preferred. J. Wong, 1475 Shotwell St., San Francisco 10, Calif.

SELL OR SWAP — Bendix TA-12, with power supply and modulator, $35; Mark II, with power, 2 to 8 mc. rcvr and transmitter, $25. Want Heath Q meter. Herbert Greenberg, 821 Rutgers Rd., Franklin Square, N. Y.

WANT — Lysco 600S instruction manual; Tri-band beam (10, 15, 20) rotator and tower, for cash or trade. L. T. Palmer, 403 Catron Avenue, Belton, Md.

FOR SALE — Ozalid Streamliner 1. n., ideal for reproducing schematics, 750 lbs. net weight. $1195. Metropolitan area only. York, 114-38 196 St., St. Albans 12, N. Y.

FOR SALE — Wire Way WP wire recorder, phonograph, amplifier in leatherette portable carrying case, excellent cond., $40. LeRoy Singer, 4 Atwood Rd., Plainsview, L. I., N.Y.

FOR SALE — Eico 324 RF sig gen. wired, $25 less postage; Webster record changer, 3-speed, GE magnetic cartridge with diamond sapphire needle, $20. Wm. R. Holleran, 323 Garland St, Pittsburgh 18, Pa.

FOR SALE — 1 HP compressor, 110-220v AC with or without spray gun; Electronic, photographic, power tools, gun, rod, 1956 Plymouth radio $60 cash, or you name it! (Local preferred) M. Storch 3605 Sedgwick Ave., Bronx 63, N. Y.

FOR SALE — NRI-88 RF-AF gen. $25; RCA 45 attachment $10; 78 rpm automatic $10; 3-speed automatic (needs repair), case amplifier and speaker $20. Want B and K CRT reactivator. C. W. Chastain, 228 Timber Lane, Memphis 12, Tenn.

SELL OR TRADE — Simpson 315 sig. gen. $20; Heath TR-2 sig tracer $15; Jackson condenser bridge $15; Magnavox 3-speed changer $10; Want binoculars, 22 rifle, geiger, square wave gen. C. H. Baines, 1410 Cedar St., West Monroe, La.

WANTED — Used Mutual conductance tube tester. Cash or trade QST back to 1924. Also have 4 el. convertible 10-15 meter beam, rotator (prop pitch) 35' glass tower. H. F. Bates, 10 Beaver Dam Rd., Scituate Harbor, Mass.

SWAP — 1/2HP GE motor, variable speed, reversible, 1725-0-1725rpm, 110-220 for self-completing electronic key or rcvr. preselector or Heath MM-1 or equivalent or what have you. Phil Gilbert, 386 South 9th St., Coshocton, Ohio.

FOR SALE — Revere 16mm movie camera, Wollensak F:1.5 focusing-mount lens, rotary shutter, single-frame, 5 speeds, new cond., $125; Cascade Disc Recorder-Radio-Phonograph, $50; Electrovoice 606-20 Dynamic mike $20. Priced fob. Marilyn Phillips, 311 Penfield, Rockford, Ill.

FOR SALE — National NC-173 rcvr. 6 meter plus 54-32 mc in four bands very clean $120; 12 channel TV sig gen. $40; BC-779 rcvr. 2.5 to 20 mc $80. H. L. Weaver, 1847 Asbury, Evanston, Ill.

SELL OR TRADE — Schematic diagrams of R-28-ARC-5, T-21-ARC-5, R-26-ARC-5, BC348-N, ART-13, BC779 (Super Pro), BC342, T-23-ARC-5, 25c each. S. Consalvo, 4905 Roanne Drive, Washington 21, D. C.

WANTED — Novice Senior and Advanced Code and Theory records State price. Norman J. McHale, 77 Turner Ave., Buffalo 20, N. Y.

WANTED — Any old gear or parts of telephones; old radio equip., or donations; books and magazines. Mark "Gift To Nonprofit Organization." Brian C. Smith, Communications Instr. Air Training Corps., 78 Wembly, Sqdn. ATC c-o 135 Harrowdene Rd., Wembly, Middlesex, UK.

FOR SALE — Knight-kit in-circuit cap. checker l. n. wired, tested, $12; Clough-Brengle OCA RF sig. gen. old but good $10. Murphy's Radio and TV, Box 103, Osprey, Fla.

WANTED — Rider Radio Manuals vols. 9 and 15 to 24 inclusive, any or all; radio sig. tracer with probes and manual. State price and cond. Curtis Appliance Service, 521 Dexter, Clay Center, Kan.

WANTED — Riders TV Service manuals. Will pay cash. Milton Leiser, 305 E. Mt. Eden Ave., New York 57, N. Y.

FOR SALE — Arkay 120 short wave rcvr. with bandspread and phone jack. $17. David Howarter, 85 W. Vine, Canton, Ill.

POSITION WANTED — Radio repair job experienced, also can do TV repair. W. V Farmer, Box 448, Avondale, Ariz.

TRADE — Precision E-400 sweep gen. with xtal, cables, instructions, used once, cost $151.90; Hickok CRT test adapter.Need Sams, Riders, comm. rcvr. 30-50Mc, National HFS or ? John Rosol, 28 Winans Ave, Newark 3, N. J.

TRADE OR SELL — Alliance TV boosters; BB-2 called Casca-Matic, AB-3 called Tenna-Scope. Both perfect Best offer. G H. Swiska, 109 E School St., Woonsocket, R. I.

FOR SALE — Complete NRI advanced TV course including lessons, kits and multitester, $75; DuMont 304 Oscillograph, $125. R. Jarer, 3023 Radcliff Ave.,Bronx, N. Y.

WANTED — Used TV antenna rotors with indicators if possible. Henry Sztencel, 643 Ellington Rd., Ridgewood, N. J.

TRADE OR SELL — 17 w portable PA system with Electro Voice Cardax mike, 12" speakers-worth $100. Will trade for good tape recorder or sell for $80 FOB. Bohac TV Service, 7409½ Beverly Blvd., Los Angeles 36, Calif.

FOR SALE — Riders Radio manuals 2, 3, 7, 8 $2 each; Riders TV manuals 2, 3, 4 $10 each George Epstein, 200-27 46th Ave., Bayside 61, N Y.

FOR SALE — Riders' Radio Manuals 2 to 16 $75. Local sale only. Emanuel Troise, 107-36 105 St., Ozone Park 17, N. Y.

TRADE — 6 GE GL211's and a used Granco LCU UHF TV conv. Need lo pwr. mobile ham transmitting gear, and or whip ant. and loading coils, TV rotator, 3-speed phono, 12" Hi-Fi spkr. H. W. Barnes, Box 207, Norwell, Mass.

SELL OR TRADE — Heath RF sig. gen. SG-8, Radio City Products Do All TV 750 sig. gen. Sprague Tel-Ohmike No. TO-4. Many other items. Best cash offer or trade for guns. Robert Shingledecker, RD 2, Bellevue, Ohio.

WANTED — Command rcvr for marine band. Jos. Malak, 5164 Haverford, Lyndhurst, Ohio.

SELL OR TRADE — Back issues of many electronics trade magazines, engineering textbooks, TV schematic books, Radio and TV parts, Radio and TV correspondence course "complete" incl. color TV. Interested in stamps. Hubert Spieker, 112 French Ave., Westmont, N. J.

WANT — NRI or Christy Electrical Appliance Repair courses; books on scopes. Frank Wayne, 1012 Bill Rd., Schenectady 3, N. Y.

SELL OR TRADE — Perfect Firestone table model radio 5 tubes $20 or trade for 20CP4B Aluminized tube. Alex Poch, Box 174, Dillonvale, Ohio.

FOR SALE — Technical magazines 10 cents each: Radio-TV Retailing 1948-51; Radio-Craft 1947-48; Radio-Electronics. All in good cond. Also, Philco audio-sig, tracer with probe. $10. You pay shipping. Ralph G. Chasse, 24 Hobson St., Methuen, Mass

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FOR SALE — NRI 67 tube tester with latest chart, will test all the latest Radio and TV tubes, $25. Sullivan's Radio and TV Service, 211 Fourth St., Fall River, Mass.

WANTED — 28v 10amp power supply or 36v 12 amp filament transformer, and DC 28c 10 amp selenium rectifere. Ham gear to trade. Bill Grebe, 518 West 9th Loveland, Colo.

FOR SALE — Garrard record changer, $27.50; Electrovoice V-1A velocity microphone, $22.50; Pickering 230-H preamplifier, $22.50 and D-120M diamond cartridge, $12.50. All in excellent cond. Shipping expense additional. Mrs. Carolyn Bargen, 3007 Rice Ave., Rockford, Ill.

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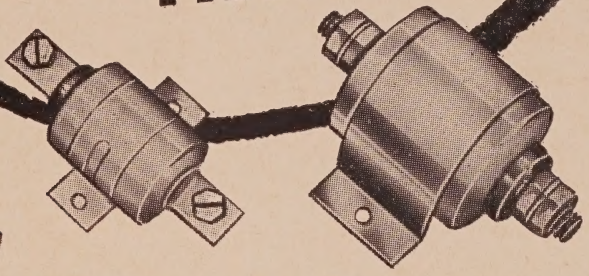

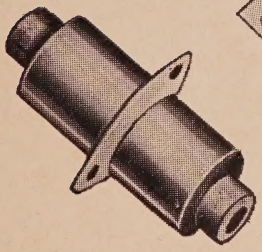

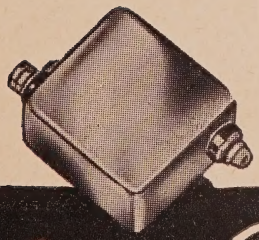

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